

Fuel Consumption and Flammability Thresholds in Shrub-dominated Ecosystems

Introduction

Research to quantify and model fuel consumption during wildland fires has been conducted in forests, but is generally lacking or of limited scope in shrub-dominated ecosystems. Shrub-dominated ecosystems, including a wide variety of chaparral, oak brush, pinyon-juniper and sagebrush types occur across several hundred million acres of private, state, and federal lands in the western United States. Many ecosystems provide habitat for sensitive, rare, threatened, and endangered species; including numerous species of birds, mammals, mollusks, insects, plants, fish, reptiles, and amphibians. This research addresses fuel consumption information needs for many arid-land managers, planners, and researchers.

Quantification of fuel consumption is critical for effective modeling of many fire effects:

- Smoke emissions
- Regional haze
- Nutrient cycling
- Plant succession
- Species composition changes
- Plant/tree mortality
- Wildlife habitat restoration and maintenance
- Erosion
- Soil heating
- Carbon cycling



Prescribed fire in big sagebrush near Cody, Wyoming in early October 2001.

It is critical to understand fuel consumption in order to evaluate the consequences of prescribed and wildland fire. Land managers use prescribed fire as a landscape-level treatment in a variety of shrub-dominated ecosystems for a number of purposes, including fuel and fire hazard reduction, wildlife habitat improvement, and ecosystem restoration. Change in vegetation structure (fuel composition, amount, and arrangement) is often the most critical measure of treatment success. This research will lead to more effective planning and implementation of prescribed fires by helping managers quantify fuel characteristics and predict fuel consumption in shrub-dominated vegetation types.

Objectives

The primary objectives of this research are to improve a preliminary fuel consumption model and determine flammability thresholds for big sage ecosystems, and to develop new fuel consumption models and flammability thresholds for flatwoods and chaparral ecosystem types. Achieving these

objectives will promote more effective and informed use of emission production, fire effects, fire behavior, and wildfire/prescribed fire tradeoff models, allowing for better wildland fire emissions and fire effects accounting and planning at all scales.

Results and Products

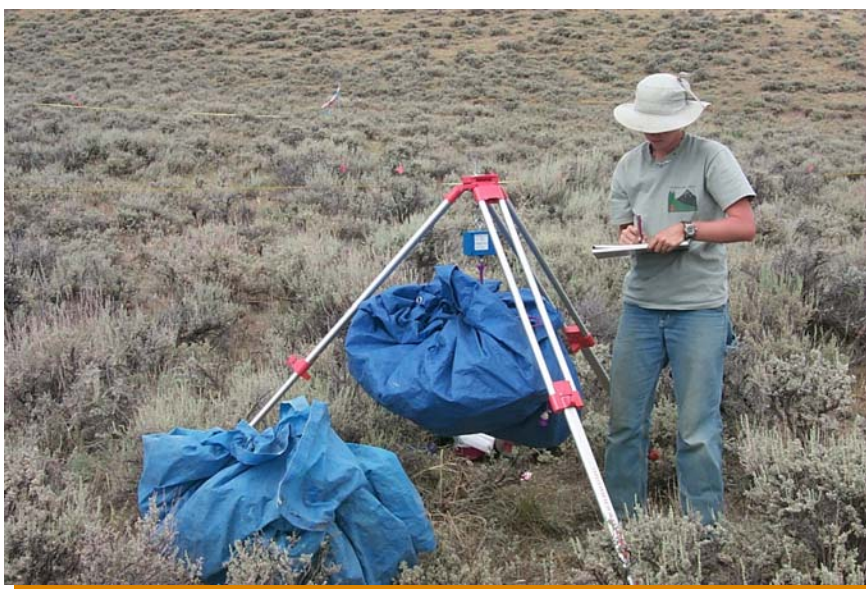
Data collection for this study will continue into 2006. After its completion, the new fuel consumption models and flammability thresholds will be incorporated into an updated version of CONSUME, a nationally-applied fuel consumption and biomass burning emissions prediction tool. The output from CONSUME will be formatted to feed other models and databases, and to provide useful information for burn planning and smoke management. CONSUME will be delivered with an easy to use interface, user's manual, and accompanying documentation. Training sessions for the new software will be arranged for interested fire and land managers, and incorporated into the curriculum of existing fire management courses. Preliminary reports, manuscripts, and models will be intermediate products as new data are gathered and analyzed.

For More Information about Fuel Consumption and Flammability Thresholds in Shrub-dominated Ecosystems

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About FIREHouse

FIREHouse is a collaboration between the Fire and Environmental Research Applications Team (FERA) of the USDA Forest Service Pacific Northwest Research Station, Pacific Wildland Fire Sciences Laboratory; the University of Washington; the National Park Service; the Bureau of Land Management – Alaska Fire Service; the US Fish and Wildlife Service; and the National Biological Information Infrastructure (NBII). Funding for FIREHouse has been provided by the Joint Fire Science Program (JFSP) and NBII. FIREHouse is coordinating efforts with the Fire Research and Management Exchange System (FRAMES) project team. Content on FIREHouse will provide substantial contributions to the FRAMES Northwest and Alaska Geo Portals.



Pre-burn sampling of big sagebrush biomass in eastern Oregon, summer 2001.

For More Information about the FIREHouse Project

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